

HRS DOCUMENTATION RECORD--REVIEW COVER SHEET

Name of Site: Hamilton/Labree Roads Ground Water Contamination

Contact Persons:

Previous Investigations: Washington State Department of Ecology
Washington State Department of Health

Documentation Record: Tara Karamas, Ecology and Environment, Inc., Seattle
David Bennett, U.S. Environmental Protection Agency, Seattle

Pathways, Components, or Threats Not Scored

The surface water migration pathway, soil exposure pathway, and air migration pathway were not scored as part of this Hazard Ranking System (HRS) evaluation. These pathways were not included because a release to these media does not significantly affect the overall site score and because the ground water migration pathway produces an overall site score well above the minimum required for the site to qualify for inclusion on the National Priorities List. These pathways are of concern to the U.S. Environmental Protection Agency and may be evaluated during future investigations.

HRS DOCUMENTATION RECORD

Name of Site: Hamilton/Labree Roads Ground Water Contamination

EPA Region 10

Date Prepared: February 18, 2000

CERCLIS No.: SFN1002174

Street Address of Site: Hamilton and Labree Roads

County and State: Chehalis, Washington

General Location in the State: Southwest

Topographic Map: Napavine Quadrangle 7.5 Minute Series

Latitude: 46° 37' 24.5" North

Longitude: 122° 55' 59" West

(Reference point: Approximate intersection of Hamilton and Labree Roads)

Scores

Ground water Pathway	75.30
Surface Water Pathway	0.00
Soil Exposure Pathway	0.00
Air Pathway	0.00

HRS SITE SCORE	37.65
-----------------------	--------------

GROUND WATER MIGRATION SCORESHEET

GROUND WATER MIGRATION PATHWAY Factor Categories & Factors	Maximum Value	Assigned Value
Likelihood of Release to an Aquifer Aquifer: Shallow Aquifer		
1. Observed Release	550	550
2. Potential to Release		
2a. Containment	10	
2b. Net Precipitation	10	
2c. Depth to Aquifer	5	
2d. Travel Time	35	
2e. Potential to Release [lines (2a + 2b + 2c)]	500	
3. Likelihood of Release	550	550
Waste Characteristics		
4. Toxicity/Mobility	*	10,000
5. Hazardous Waste Quantity	*	100
6. Waste Characteristics	100	32
Targets		
7. Nearest Well	50	50
8. Population		
8a. Level I Concentrations	**	280
8b. Level II Concentrations	**	0
8c. Potential Contamination	**	23
8d. Population (lines 8a+8b+8c)	**	303
9. Resources	5	0
10. Wellhead Protection Area	20	0
11. Targets (lines 7 + 8d + 9 + 10)	**	353
12. Targets (including overlying aquifers)	**	353
13. Aquifer Score	100	75.3
14. Ground water MIGRATION PATHWAY SCORE (S_{gw})	100	75.30

* Maximum value applies to waste characteristics category

** Maximum value not applicable

WORKSHEET FOR COMPUTING HRS SITE SCORE

	S	S ²
1. Ground Water Migration Pathway Score (S _{GW})	75.30	5670.09
2a. Surface Water Overland Flow/Flood Component (from HRS Table 4-1, line 30)	Not Scored	
2b. Ground water to Surface Water Migration Component (from HRS Table 4-25, line 28)	Not Scored	
2c. Surface Water Migration Pathway Score (S _{sw}) Enter the larger of lines 2a and 2b as the pathway score	Not Scored	0
3 Soil Exposure Pathway Score (S _s)	Not Scored	0
4. Air Migration Pathway Score (S _a) (from HRS Table 6-1, line 12)	Not Scored	0
5. Total of S _{GW} ² + S _{sw} ² + S _s ² + S _a ²	75.30	5670.09
6. HRS Site Score. Divide the value on line 5 by 4 and take the square root.	37.65	

REFERENCES

Reference

Number Description of the Reference

1. U.S. Environmental Protection Agency, December 14, 1990. *Hazard Ranking System, Final Rule*, 40 CFR Part 300, Appendix A. (Not included - publically available)
2. U.S. Environmental Protection Agency, June 1996. *Superfund Chemical Data Matrix*.
3. U.S. Geological Survey, 7.5 minute series, Topographic Maps: Napavine Washington Quadrangle 1985; Centralia Washington Quadrangle 1985; Jackson Prairie Washington Quadrangle 1985.
4. Weigle, J.M. and B.L. Foxworthy, 1962, *Geology and Groundwater Resources of West-Central Lewis County, Washington*, Washington Division of Water Resources, Water Supply Bulletin No. 17, 7 pages.
5. SAIC, June 1997. Prepared for Washington Department of Ecology, Toxics Cleanup Program. *Phase I and II Data Presentation Report for Hamilton/Labree Roads PCE in Ground water Site*, 259 pages.
6. U.S. Environmental Protection Agency, November 1996. *Using Qualified Data to Document an Observed Release and Observed Contamination*, OSWER 9285.7-14FS, 18 pages.
7. Washington State Department of Ecology, Data from Hamilton/Labree sampling events, 699 pages.
8. Washington State Department of Ecology, January 1999, *Source Investigation Report for Hamilton/Labree Roads Chlorinated Solvent Site*, Chehalis, Washington, 64 pages.
9. Ashley, Steve, City of Napavine, Department of Public Works, November 23, 1999, telephone conversation with Tara Karamas, Ecology and Environment, Inc., regarding the City of Napavine municipal wells, 3 pages.
10. Washington State Department of Ecology, 1997 through 1999, Groundwater Sampling Field Logbook, 59 pages.
11. Alexanian, Daniel, Washington State Department of Ecology, February 7, 2000, telephone conversation with Tara Karamas, Ecology and Environment, Inc., regarding well depths, 1 page.
12. GEO RECON International, October 11, 1996, *Geophysical Investigation of Hamilton/Labree Properties*, Chehalis, Washington, 14 pages (including 10 figures).
13. Howard, Philip, 1990, *Handbook of Environmental Fate and Exposure Data*, 18 pages.
14. Balaraju, Panjini, Washington State Department of Ecology, December 12, 1999, Memorandum regarding the drum removal conducted at the S.C. Breen Construction Company property in September 1999, 3 pages.
15. Dames and Moore, Inc., July 7, 1994, *Groundwater Resources Investigation for Ecology Groundwater Right Application No. G2-29004*, 11 pages.
16. Washington State, Lewis County well logs, 288 pages.
17. Washington Department of Health, 1993-1997 Groundwater Sampling Data, 178 pages.
18. U.S. Census Bureau, 1990, *1990 Census of Population and Housing for Lewis County*, Washington, 3 pages.

19. Washington State Department of Ecology, 1997, Notes regarding the number of people affected by the ground water contamination, 7 pages.
20. Washington State Department of Ecology, December 1997, *Hamilton/Labree Roads Soil Sampling and Groundwater Monitoring Quality Assurance Project Plan*, 8 pages.
21. Washington State Department of Ecology, June 2, 1999, Memorandum to Panjini Balaraju regarding a Hamilton/Labree Roads PCE Site Groundwater Monitoring from October 1997 - July 1998, 19 pages.
22. Science Applications International Corporation, 1997, Phase I and II Field Logbooks, 3 books total. Logbook 1, 47 pages; Logbook 2, 24 pages, Logbook 3, 24 pages.
23. Woodke, Mark, Ecology and Environment, Inc., December 18, 1999, Memorandum to Tara Karamas regarding the bias of E-qualified data, 1 page.
24. Karamas, Tara, Ecology and Environment, Inc., December 28, 1999, Memorandum to file regarding the calculations of SQLs, 4 pages.
25. Balaraju, Panjini, Washington Department of Ecology, December 12, 1999, telephone conversation with Tara Karamas, Ecology and Environment, Inc., regarding the 1999 removal action, 1 page.
26. Alexanian, Daniel, Washington State Department of Ecology, June 18, 1999, Notes regarding the installation of 7 monitoring wells, 3 pages.

SOURCE DESCRIPTION

2.2 SOURCE CHARACTERIZATION

Number of the source: 1

Name and description of the source: Drums

The Washington State Department of Ecology (Ecology), obtained anecdotal information which indicated that drums containing solvents may have been buried or emptied in the late 1970s or early 1980s, near the center of the property northeast of the Hamilton/Labree Roads intersection (Ref. 8, pp. 1, 4, 24). This property houses several buildings and presently is owned by S.C. Breen Construction Company (Ref. 8, pp. 1, 9; Ref. 5, p. 4). The property was occupied by a surplus store and Breen construction maintenance shop, but has recently been the location of Bulldog Trailer Manufacturing (Ref. 14, p. 1). Interviews with local residents yielded information that the surplus store acquired a variety of chemicals for which it did not have ready market. Some of these items, in 55-gallon drums and smaller containers, disappeared at the same time that a large pit had been excavated on the Breen property and subsequently filled over the course of one weekend in the early 1980s (Ref. 14, p. 1).

In an attempt to locate a source of the tetrachloroethene (PCE) contamination in the ground water, Ecology performed a geophysical investigation in October 1996 for the property located at the intersection of Hamilton and Labree Roads (Ref. 12, p. 1; Ref. 8, p. 24). The investigation did not show any clear evidence of buried intact drums (Ref. 8, p. 1; Ref. 12 p. 2). The results of the electromagnetic survey did show some anomalies (Ref. 14, p. 1). In September 1999, the excavation was started at one of the anomaly areas inside the Bulldog Trailer building, which is approximately 100 feet long and 50 feet wide (Ref. 14, pp. 1, 3). Within two feet below the ground, a couple of 55-gallon drums were uncovered (Ref. 14, pp. 1, 2). The excavation was continued both towards the east and west of the building (Ref. 14, p. 2). Three layers of 55-gallon drums were found up to a depth of 10 feet (Ref. 14, p. 2). Sixty-four drums were excavated from this location (Ref. 8, pp. 1, 9; Ref. 14, p. 2). The drums were transported offsite by the S.C. Breen Construction Company, to a RCRA Treatment, Storage, and Disposal facility on November 4, 1999 (Ref. 14, p. 2).

All the drums contained a black viscous sludge and water (ground water had seeped into the drums) (Ref. 25). Most of the drums were leaking at the time of removal and the leaked sludge was sampled (Ref. 25). There were two distinct phases (water and sludge) and both phases were sampled (Ref. 25). The results indicated the presence of several volatile organic compounds (VOCs), including tetrachloroethene (PCE) and several of this compound's degradation products including cis-1,2-dichloroethene, 1,1,1-trichloroethane, trichloroethene (TCE), and vinyl chloride (Ref. 7, pp. 644, 647; Ref. 13).

Location of the source, with reference to the site:

The building from which the drums were excavated in September 1999, is located at the intersection of Hamilton and Labree Roads (151 and 159 Hamilton Rd.) in Chehalis, WA (Ref. 8, Figure 2, p. 24; Ref. 14, p. 1).

Containment

There is no evidence of the presence of a maintained engineered cover, or a functioning and maintained run-on control system and runoff management system (Ref. 14, p. 1). In addition, there is evidence of hazardous substance migration as documented in Section 3.1.1 of this documentation record.

Containment Value: 10 (Ref. 1, Table 4-2)

2.2.2 Hazardous Substances

As discussed in Section 2.2 of this HRS documentation record, the sludge from the leaking drums was sampled (Ref. 25). The following is a list of hazardous substances detected in the water phase samples (Ref. 1, Section 2.2.2; Ref. 7, pp. 644, 647).

<u>Substance</u>	<u>Evidence (i.e., sample number)</u>
cis-1,2-Dichloroethene	HLBREEN1, HLBREEN2
1,1,1-Trichloroethane	HLBREEN1, HLBREEN2
Tetrachloroethene	HLBREEN1, HLBREEN2
Trichloroethene	HLBREEN1, HLBREEN2
Vinyl Chloride	HLBREEN1

2.4.2 Hazardous Waste Quantity

2.4.2.1.1 Hazardous Constituent Quantity

There are insufficient data to document a hazardous constituent quantity; therefore a 0 is assigned for this source (Ref. 1, Section 2.4.2.1.1).

Hazardous Constituent Quantity Value (S): NS

2.4.2.1.2 Hazardous Wastestream Quantity

There are insufficient data to document a hazardous wastestream quantity; therefore a 0 is assigned for this source (Ref. 1, Section 2.4.2.1.2).

Hazardous Wastestream Quantity Value (W): NS

2.4.2.1.3 Volume

Sixty-four, 55-gallon drums were removed from the Bulldog trailer. Therefore, the volume of this source is

$$64 \times 55 = 3,520 \text{ gallons} \div 500 = 7.04$$

Volume Assigned Value: 7.04
Ref. 1, Table 2-5
Ref. 14, p. 2

2.4.2.1.4 Area

There are insufficient data to document an area. In addition, this tier is not scored because the Volume measure for this source was calculated and is being used in scoring.

Area Assigned Value: NS

=====

Source Hazardous Waste Quantity Factor Value: 7.04

SOURCE DESCRIPTION

2.2 SOURCE CHARACTERIZATION

Number of the source: 2

Name and description of the source: Ground water plume

It is assumed that regionally, ground water flows toward the Newaukum River, which is located approximately 2,000 feet west from Source 1 at its closest point (Ref. 5, p. 5). Even though one source of PCE contamination has been located on the Breen property (i.e., Source 1), it does not appear to account for the entire ground water plume, as some portions of the plume are upgradient and cross-gradient to this source. Therefore, these portions of the plume constitute areas of a ground water plume with no identified source. This section will describe the rationale for this assumption.

In 1994, testing of the drinking water wells by the Department of Health (DOH) revealed that six wells in the vicinity of the intersection of Hamilton and Labree Roads were contaminated with PCE (Ref. 5, p. 1). PCE levels ranged from 3 ug/L to 2,165 ug/L; reportedly the highest level found in drinking water in the state of Washington (Ref. 5, p.1). The known contaminated drinking water wells are located in a shallow aquifer, approximately 40 to 60 feet below ground surface (bgs) (Ref. 5, p. 1). Wells located in a deeper aquifer, approximately 150 to 200 feet bgs were not contaminated (Ref. 5, p. 1). In late 1996, Ecology conducted site investigations with the objective of locating a source for this contamination (Ref. 5, p. 1; Ref. 22). As an outcome of this investigation Source 1 was identified, however, because some areas of ground water contamination were upgradient or cross-gradient to this source, it was suspected that additional source(s) were contributing to the ground water contamination plume (see Section 2.2, Source 1). Phase I field activities were conducted from mid-February through early March and included the installation and sampling of four ground water monitoring wells designated as MW-1, MW-2, MW-3, and MW-4 (Ref. 5, pp. 1, 15). All four wells were approximately 50 feet bgs and screened in the shallow aquifer (Ref. 5, pp. 15, A-1 through A-9). PCE was detected at concentrations ranging from 250 ug/L to 640 ug/L in ground water samples collected from three of these wells (MW-2, MW-3, MW-4) (Ref. 5, pp. 1). MW-1, MW-3, MW-5, MW-6 are located upgradient to Source 1 and the remaining monitoring wells are located cross-gradient/downgradient to Source 1, which at this point had not been identified (Ref. 5, Figure 2).

Based on the findings of the Phase I investigation, a Phase II investigation was conducted by Ecology, in late April and early May 1997 (Ref. 5, p. 1). Four additional ground water monitoring wells were installed (MW-5, MW-6, MW-7, and MW-8) as part of the Phase II effort to determine where the highest PCE ground water concentrations were occurring that would be used as an indication of the location of the PCE contamination source (Ref. 5, p. 1). PCE was detected in concentrations ranging between 3 ug/L and 1,500 ug/L in three of the four wells (MW-5, MW-6, and MW-8) which are downgradient and cross-gradient to Source 1 (Ref. 5, pp. 3, 25).

Location of the source, with reference to the site:

The contaminated ground water plume is located approximately 3 miles south of Chehalis, Washington, near the intersection of Hamilton and Labree Roads (Ref. 8, pp. 1, 31). The extent of contamination is unknown, however, it is expected that the plume is defined to the north by MW-1 and MW-7; to the west by the Ellenberg well on Rice Road; to the east by Berwick Creek; and to the south possibly near private wells 2 or 3.

Containment

There is no evidence of the presence of a maintained engineered cover, or a functioning and maintained run-on control system and runoff management system (Ref. 14).

Containment Value: 10 (Ref. 1, Table 4-2)

2.2.2 Hazardous Substances

As discussed in Source 1, Section 2.2 of this HRS documentation record, several rounds of ground water sampling have been completed by Ecology and WA DOH. The following is a list of hazardous substances detected in the ground water (Ref. 1, Section 2.2.2; Ref. 5, pp. D145 through D156, D158, D159, D160, D171, D174; Ref. 7, pp. 6, 8, 10, 12, 14, 16, 20, 22, 30, 32, 34, 36, 38, 40, 41, 43, 45, 47, 49, 51, 143, 145, 147, 149, 151, 153, 159, 161, 165, 167, 169, 171, 173a, 174, 178, 180, 182, 184, 186, 188, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 286, 288, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 348, 350, 352, 354, 356, 358, 360, 415, 464, 466, 470, 472, 497, 499, 501, 503, 505, 507, 509, 511, 513, 515, 517, 519, 521, 523, 525, 527, 529, 531, 536, 538, 631).

<u>Substance</u>	<u>Evidence (i.e., sample number)</u>
cis-1,2-Dichloroethene	HL-9 (Thurman)
Tetrachloroethene	HL-2 (Hamilton), HL-3 (High Reach), HL-4 (Veenhouwer), HL-7 (Veenhouwer), HL-9, MW-2, MW-3, MW-4, MW-6, MW-8, MW-R1, MW-R2, MW-R4, MW-R5, MW-R6, MW-R7
Trichloroethene	HL-2, HL-3, HL-9, MW-3, MW-4, MW-8

2.4.2 Hazardous Waste Quantity

2.4.2.1.1 Hazardous Constituent Quantity

There are insufficient data to document a hazardous constituent quantity; therefore a 0 is assigned for this source (Ref. 1, Section 2.4.2.1.1).

Hazardous Constituent Quantity Value (S): NS

2.4.2.1.2 Hazardous Wastestream Quantity

There are insufficient data to document a hazardous constituent quantity; therefore a 0 is assigned for this source (Ref. 1, Section 2.4.2.1.2).

Hazardous Wastestream Quantity Value (W): NS

2.4.2.1.3 Volume

The full horizontal and vertical extent of the plume is not known; however, based on analytical results of ground water samples collected in the mid to late 1990s, it is apparent that some amount of contamination is present. Since the exact volume is unknown, a source waste quantity of greater than 0 will be assigned. (Ref. 1, Section 2.4.2.1.3).

Volume Assigned Value: >0
Ref. 1, Table 2-5

2.4.2.1.4 Area

Since the volume of the waste source can be determined, a value of 0 is given for the area measurement (Ref. 1, Section 2.4.2.1.4).

Area Assigned Value: 0

=====

Source Hazardous Waste Quantity Factor Value: >0

SUMMARY OF SOURCE DESCRIPTIONS

Source No.	Source Hazardous Waste Quantity Value	Containment Value for Ground Water
1. Drums ^a	7.04	10 ^b
2. Contaminated Ground water ^a	> 0	10 ^b

a = See Section 2.4.2 of this document.

b = Ref. 1, Table 3-2

3.0 GROUND WATER MIGRATION PATHWAY

3.0.1 General Considerations

The aquifer unit scored is in the Newaukum River Valley system and the surface soils, which are underlain by the Newaukum terrace unit (Ref. 5, p. 18). Many parts of the terrace unit are underlain by the nonmarine unit of Miocene and Pliocene age (Ref. 4, p. 54). The materials of the Newaukum terrace unit, in general, are a poorly sorted mixture of sand and subrounded pebbles and cobbles, bound in a matrix of yellow or yellow-gray clay and silt (Ref. 4, p. 33). Silt or clay lenses also are present, but are not considered to be of sufficient size or number to be noted in the records kept by well drillers (Ref. 4, p. 33). The Newaukum terrace unit usually ranges in thickness from less than 20 feet to less than 60 feet thick (Ref. 4, p. 34). In the vicinity of the Hamilton/Labree Roads intersection, ground water would be expected to flow toward the Newaukum River, with some localized influence due to the ephemeral stream whose channel lies along the south side of the site (Ref. 5, p. 8). It is difficult to speculate on how much influence the channel would have on ground water flow and contaminant migration at the site, because the PCE contamination appears to reside at significantly greater depths (Ref. 5, p. 8). The Newaukum River Valley system contains two aquifers: a shallow, alluvium aquifer and a deep, nonmarine aquifer (Ref. 5, p. 18). There is a thick bluish-gray clayey silt layer between the shallow and deep aquifers (Ref. 5, p. 7). The blue clay silt layer constitutes an aquitard separating the shallow unconfined aquifer from the deep, nonmarine aquifer (Ref. 5, p. 7). The deep aquifer produced a lower score than the shallow aquifer and therefore, the aquifer scored is the shallow aquifer.

Stratum 1 (shallowest)

Stratum Name: Alluvium/Shallow Aquifer

Description: The alluvium of the Newaukum River valley system consists predominantly of fine materials (Ref. 4, p. 59). Locally, however, well logs report the existence of gravel or boulders (Ref. 4, p. 59). The alluvium (including Chehalis Lake sediments) range in thickness from a few feet to a few tens of feet (Ref. 4, p. 60). Of the shallow wells in Newaukum River valley known to tap alluvium, few are more than 30 to 40 feet deep (Ref. 4, p. 60). Most water wells in the site vicinity are completed in the upper yellowish clayey sand and gravel layer above the blue clay and silt (Ref. 15, p. 24). This material, which is saturated in the site vicinity, is known to produce quantities of water sufficient for domestic use, and is referred to as the shallow aquifer (Ref. 15, p. 24). Elevations at the surface of the clay layer suggest that the unit is dipping in a west-northwest direction with about three feet of relief across the site (Ref. 8, p. 3). Private water wells which are reported to be less than 100 feet deep and above the blue clay layer are considered to be in this shallow aquifer (Ref. 15, p. 24).

Stratum 2

Stratum Name: Nonmarine/Deep Aquifer

Description: The nonmarine unit of the Newaukum River Valley system is a productive source of ground water only in the valleys of the Newaukum River and its north and south forks, and to a limited extent laterally on the upland plain and intermediate terraces (Ref. 4, p. 60). The nonmarine unit consists chiefly of thin-bedded clay, silt, and sand of laustrine or fluvial origin, with occasional beds of conglomerate, diatomite, tuff, and fine-grained volcanic ash (Ref. 4, p. 26). Many of the beds, especially in the lower part of the unit, have been indurated to shale, siltstone, or sandstone (Ref. 4, p. 26). The predominant colors in this unit are blue, blue-green, and blue-gray (Ref. 4, p. 26). Through most of its extent, the nonmarine unit has yielded only small amounts of water to wells (Ref. 4, p. 26). Most of the wells that penetrate this unit end in its upper part, which consists largely of relatively impermeable clay and silty clay (Ref. 4, p. 26). Private water wells which were reported to be 100 feet deep or greater are considered to be within the deep aquifer (Ref. 15, p. 26).

3.1 LIKELIHOOD OF RELEASE

3.1.1 Observed Release

Chemical Analysis

Aquifer Being Evaluated: Shallow Aquifer

There are a total of 252 drinking water wells within 4 miles of the site screened within the shallow aquifer (Ref. 16). Six of these wells are located in the immediate vicinity of the site (Ref. 5, p. 26; Ref. 8, p. 24). Eight monitoring wells were installed in 1997 during a Phase I and II investigation to evaluate potential sources (Ref. 5, p. 10). Five of the well locations (MW-1, MW-2, MW-6, MW-7, and MW-8) are located on the triangular property east of the intersection of Hamilton and Labree Roads (Ref. 5, pp. 10, 11). Of the remaining three wells, MW-3 is located in the open field between the Breen property, Veenhouwer, and the High Reach business (Ref. 5, pp. 10, 11). MW-4 is located within the Veenhouwer's cow pasture and MW-5 is located in a gravel pullout area just north of the westerly bend in Hamilton Road (Ref. 5, pp. 10, 11).

To date, Ecology has completed 4 quarterly sampling events (October 1997 and January, April, and July 1998), which have included collecting ground water samples from the 6 drinking water wells within the PCE contamination plume, along with 8 monitoring wells (Ref. 10, pp. 1 through 30; Ref. 20, p. 3). Additionally, Ecology sampled these wells during two semiannual sampling events in February and July 1999 (Ref. 10, pp. 31 through 59; Ref. 21, p. 3). Seven new monitoring wells were installed and sampled as part of the second semiannual event (Ref. 21, p. 3). Phase I and II investigations were completed in 1997, which included collecting samples from the 6 drinking water wells (Ref. 21, p. 3; Ref. 5, p. 13). The Washington State Department of Health (WA DOH) has completed three rounds of domestic well sampling at this site (September 1993, March 1994, and June 1996) (Ref. 21, p. 3).

All of the sampled water wells are screened in the shallow aquifer (Ref. 5, pp. A4 through A10, A13, A14, A17, A18; Ref. 16, pp. 288, 289; Ref. 19). The screened intervals for each of the sampled wells that will be used to document observed releases are as follows:

<u>Well Number</u> (Associated Well Names)	<u>Screened Interval</u> (feet bgs)	<u>Reference</u>
2 (Hamilton, Smith Tractor, GW-HMW-01-01, HL-2)	42 to 49	Ref. 16, p. 289
3 (High Reach, United Rentals, GW-HRW-01-01, HL-3)	42 to 46	Ref. 16, p. 288
4 (Veenhouwer, GW-VH4-01-01, HL-4)	unknown * depth of well:	
7 (Veenhouwer, GW-VH7-01-01, HL-7)	unknown * depth of well:	
9 (Thurman, GW-THR-01-01, HL-9)	unknown * depth of well:	
MW-2 (GW-002-01-01)	36 to 46	Ref. 5, pp. A4, A5
MW-3 (GW-003-01-01)	35 to 45	Ref. 5, pp. A6, A7

<u>Well Number</u> (Associated Well Names)	<u>Screened Interval</u> (feet bgs)	<u>Reference</u>
MW-4 (GW-004-01-02)	35 to 45	Ref. 5, pp. A9, A10
MW-6 (GW-006-01-01)	37 to 47	Ref. 5, pp. A13, A14
MW-8 (GW-008-01-01)	35 to 45	Ref. 5, pp. A17, A18
MW-R1	17 to 27	Ref. 26, p. 1
MW-R2	17 to 27	Ref. 26, p. 1
MW-R4	16 to 26	Ref. 26, p. 3
MW-R5	18 to 28	Ref. 26, p. 1
MW-R6	16 to 26	Ref. 26, p. 2
MW-R7	17 to 27	Ref. 26, p. 2

- Residential wells 4, 7, and 9 were constructed prior to 1973, when recording well construction was not required. Therefore, no well logs exist for these wells (Ref. 11). However, Ecology did determine that these wells were drawing from the shallow aquifer by measuring field parameters, such as specific conductance (Ref. 5, p. 17; Ref. 11). The specific conductance values for wells screened in the shallow aquifer range from approximately 90 to 260 $\mu\text{S}/\text{cm}$, whereas wells screened in the deep aquifer exhibit much higher values (e.g., 790 $\mu\text{S}/\text{cm}$) (Ref. 5, p. 17; Ref. 11).

For HRS purposes, MW-1 was designated as background based on its location and contaminant results. MW-1 is located to the northeast of the PCE contamination source, is on the fringe of the PCE plume, and has exhibited no or little contamination (Ref. 5, p. 26; Ref. 7, p. 163). The highest PCE concentration detected in MW-1 (0.87 J) was chosen as the background concentration for observed release evaluations of the other sampled wells (Ref. 1, Table 2-3; Ref. 7, p. 163). This concentration was detected during the third quarterly sampling event on April 27, 1998 (Ref. 7, p. 163).

A review of analytical data from ground water samples collected from private residential wells by Ecology, the state contractor, and WA DOH indicates that there is an observed release of PCE and other volatile organic compounds to the aquifer of concern when compared to the analytical results from background well MW-1.

Tables 1 through 10 demonstrate well results from the sampling events mentioned above for concentrations that meet observed release criteria (Ref. 1, Table 2-3).

Table 1 Historic Sampling Data Collected by the Washington State Department of Health ($\mu\text{g/L}$)					
Well Name	Private Well Number	Sample Date	Tetrachloroethene Concentration	SQL	Reference
MW-1 (Background)		4/98	0.87 J (8.7)	1	Ref. 7, p. 163; Ref. 24, p. 1
Hamilton	2	9/28/93	119	5	Ref. 17, pp. 33
		6/25/96	130.2	5	Ref. 17, pp. 108
High Reach	3	9/28/93	122	5	Ref. 17, pp. 29
		6/25/96	283.8	5	Ref. 17, pp. 110
Veenhouwer	4	10/20/93	204	5	Ref. 17, pp. 45
		6/25/96	203.6	5	Ref. 17, pp. 116
Veenhouwer	7	11/17/93	572	5	Ref. 17, pp. 65
Thurman	9	3/10/94	2,165	5	Ref. 17, pp. 81
		6/25/96	3,009	5	Ref. 17, pp. 120

Notes:

Values in parentheses are the adjusted concentration as per *Using Qualified Data to Establish an Observed Release and Observed Contamination* (Ref. 6). Since the bias for all "J" qualified data was not included on the original Form 1s, all "J" qualified data are assumed to have an unknown bias.

Key

J - The analyte was positively identified; the associated value is an estimate.

MW - Monitoring well.

SQL - Sample quantitation limit.

$\mu\text{g/L}$ - micrograms per liter.

Table 2 Phase I Ground water Sampling Results (March 3- 4, 1997; April 11, 1997) (µg/L)					
Well Name	Tetrachloroethene	SQL	Trichloroethene	SQL	Reference
MW-1 (Background)	0.87 J (8.7)	1	1 U	1	Ref. 7, p. 163; Ref. 24, p. 2
GW-002-01-01 (DL)	300 D	15			Ref. 5, pp. D145, D146; Ref. 24, p. 2
GW-003-01-01 (DL)	640 D	15			Ref. 5, pp. D147, D148; Ref. 24, p. 2
GW-004-01-01 (DL)	250 D	6			Ref. 5, pp. D149, D150; Ref. 24, p. 2
GW-004-01-02	290 E	3			Ref. 5, pp. D151; Ref. 24, p. 2
GW-HRW-01-01 (DL)	270 D	15			Ref. 5, pp. D152, D153; Ref. 24, p. 2
GW-HMW-01-01	130	3			Ref. 5, pp. D154; Ref. 24, p. 2
GW-VH4-01-01 (DL)	210 D	6			Ref. 5, pp. D155, D156; Ref. 24, p. 2
GW-VH7-01-01 (DL)	570 D	15			Ref. 5, pp. D158, D159; Ref. 24, p. 2
GW-THR-01-02-01	2,700	60	37	30	Ref. 5, pp. D160; Ref. 24, p. 2

Notes:

Blank cells indicate that the analyte was not detected.

Values in parentheses are the adjusted concentration as per *Using Qualified Data to Establish an Observed Release and Observed Contamination* (Ref. 6). Since the bias for all "J" qualified data was not included on the original Form 1s, all "J" qualified data are assumed to have an unknown bias.

Key

D - The value reported was derived from the analysis of a diluted sample or sample extract.

DL - Diluted sample.

E - This qualifier is used when the concentration of the associated value exceeds the known calibration range. The associated numerical result is an estimate. This qualifier is considered to be biased low (Ref. 23).

GW - Ground water.

HRW - High Reach well.

HMW - Hamilton well.

J - The analyte was positively identified; the associated value is an estimate.

MW - Monitoring well.

SQL - Sample Quantitation Limit.

THR - Thurman well.

U - The analyte was not detected.

µg/L - micrograms per liter.

VH - Veenhouwer well.

Table 3 Phase II Ground water Sampling Results (May 8, 1997) (μg/L)			
Well Name	Tetrachloroethene	SQL	Reference
MW-1 (Background)	0.87 J (8.7)	1	Ref. 7, p. 163; Ref. 24, p. 2
GW-006-01-01	170	3	Ref. 5, p. D171; Ref. 24, p. 2
GW-008-01-01	1,500	60	Ref. 5, p. D174; Ref. 24, p. 2

Notes:

Blank cells indicate that the analyte was not detected.

Values in parentheses are the adjusted concentration as per *Using Qualified Data to Establish an Observed Release and Observed Contamination* (Ref. 6). Since the bias for all "J" qualified data was not included on the original Form 1s, all "J" qualified data are assumed to have an unknown bias.

Key

GW - Ground water.

J - The analyte was positively identified; the associated value is an estimate.

MW - Monitoring well.

SQL - Sample Quantitation Limit.

μg/L - micrograms per liter.

Table 4
Analytical Results from the First Quarterly Monitoring Event Performed by Ecology
(October 8, 9, and 10, 1997)
($\mu\text{g/L}$)

Well Name	Tetrachloroethene	SQL	Trichloroethene	SQL	cis-1,2-Dichloroethene	SQL	Reference
MW-1 (Background)	0.87 J (8.7)	1	1 U	1	1 U	1	Ref. 7, p. 163; Ref. 24, p. 2
HL-9 (DL) (Thurman)	3,740	100	12	1	8	1	Ref. 7, pp. 322, 324; Ref. 24, p. 2
MW-6 (DL)	196	50					Ref. 7, pp. 326, 328; Ref. 24, p. 2
MW-2 (DL)	257	50					Ref. 7, pp. 330, 332; Ref. 24, p. 2
MW-3 (DL)	1,280	100	2.7	1			Ref. 7, pp. 334, 336; Ref. 24, p. 2
MW-3A (DL)	1,180	100	2.7	1			Ref. 7, pp. 338, 340; Ref. 24, p. 2
MW-4 (DL)	304	50					Ref. 7, pp. 342, 344; Ref. 24, p. 2
HL-3 (DL) (High Reach)	347	50					Ref. 7, pp. 348, 350; Ref. 24, p. 2
MW-8 (DL)	1,700	250					Ref. 7, pp. 352, 354; Ref. 24, p. 2
HL-7 DL (Veenhouwer)	613	50					Ref. 7, pp. 356, 358; Ref. 24, p. 2
HL-4 (Veenhouwer)	219	5					Ref. 7, p. 360; Ref. 24, p. 2

Notes:

Blank cells indicate that the analyte was not detected.

Values in parentheses are the adjusted concentration as per *Using Qualified Data to Establish an Observed Release and Observed Contamination* (Ref. 6). Since the bias for all "J" qualified data was not included on the original Form 1s, all "J" qualified data are assumed to have an unknown bias.

Key

DL - Diluted sample.

J - The analyte was positively identified; the associated value is an estimate.

HL - Hamilton Labree.

MW - Monitoring well.

SQL - Sample Quantitation Limit.

U - The analyte was not detected.

$\mu\text{g/L}$ - micrograms per liter.

Table 5 Analytical Results from the Second Quarterly Monitoring Event Performed by Ecology (January 26, 27, 28, and 29, 1998) ($\mu\text{g/L}$)					
Well Name	Tetrachloroethene	SQL	Trichloroethene	SQL	Reference
MW-1 (Background)	0.87 J (8.7)	1	1 U	1	Ref. 7, p. 163; Ref. 24, p. 2
HL-2 (DL)	140	10	1.1	10	Ref. 7, pp. 6, 8; Ref. 24, p. 2
HL-3 (DL)	380	20	1.5	1	Ref. 7, pp. 10, 12; Ref. 24, p. 2
HL-4 (DL)	188	10			Ref. 7, pp. 14, 16; Ref. 24, p. 2
HL-7 (DL)	708	50			Ref. 7, pp. 20, 22; Ref. 24, p. 3
MW-6 (DL)	200	20			Ref. 7, pp. 30, 32; Ref. 24, p. 3
MW-2 (DL)	285	20			Ref. 7, pp. 34, 36; Ref. 24, p. 3
MW-4 (DL)	344	20	1.1	1	Ref. 7, pp. 38, 40a; Ref. 24, p. 3
MW-3 (DL)	811	100	2.4	1	Ref. 7, pp. 41, 43; Ref. 24, p. 3
MW-3A (DL)	847	100	2.4	1	Ref. 7, pp. 45, 47; Ref. 24, p. 3
MW-8 (DL)	1,850	100	1.6	1	Ref. 7, pp. 49, 51; Ref. 24, p. 3

Notes:

Blank cells indicate that the analyte was not detected.

Values in parentheses are the adjusted concentration as per *Using Qualified Data to Establish an Observed Release and Observed Contamination* (Ref. 6). Since the bias for all "J" qualified data was not included on the original Form 1s, all "J" qualified data are assumed to have an unknown bias.

Key

DL - Diluted sample.

HL - Hamilton Labree.

J - The analyte was positively identified; the associated value is an estimate.

MW - Monitoring well.

SQL - Sample Quantitation Limit.

U - The analyte was not detected.

$\mu\text{g/L}$ - micrograms per liter.

Table 6
Analytical Results from the Third Quarterly Monitoring Event Performed by Ecology
(April 27, 28, and 29, 1998)
($\mu\text{g/L}$)

Well Name	Tetrachloroethene	SQL	Trichloroethene	SQL	Reference
MW-1 (Background)	0.87 J (8.7)	1	1 U	1	Ref. 7, p. 163; Ref. 24, p. 2
HL-3 (DL)	381	25	2.1	1	Ref. 7, pp. 143, 145; Ref. 24, p. 3
MW-3 (DL)	1,350	50	3	1	Ref. 7, pp. 147, 149; Ref. 24, p. 3
MW-3A (DL)	1,320	50	2.9	1	Ref. 7, pp. 151, 153; Ref. 24, p. 3
MW-4 (DL)	396	25	1.3	1	Ref. 7, pp. 159, 161; Ref. 24, p. 3
MW-6 (DL)	170	10			Ref. 7, pp. 165, 167; Ref. 24, p. 3
MW-2 (DL)	229	25			Ref. 7, pp. 169, 171; Ref. 24, p. 3
MW-8 (DL)	2,000	50	1.5	1	Ref. 7, pp. 173a, 174; Ref. 24, p. 3
HL-7 (DL)	762	50			Ref. 7, pp. 178, 180; Ref. 24, p. 3
HL-4 (DL)	242	25			Ref. 7, pp. 182, 184; Ref. 24, p. 3
HL-2 (DL)	87	10			Ref. 7, pp. 186, 188; Ref. 24, p. 3

Notes:

Blank cells indicate that the analyte was not detected.

Values in parentheses are the adjusted concentration as per *Using Qualified Data to Establish an Observed Release and Observed Contamination* (Ref. 6). Since the bias for all "J" qualified data was not included on the original Form 1s, all "J" qualified data are assumed to have an unknown bias.

Key

DL - Diluted sample.

HL - Hamilton Labree.

J - The analyte was positively identified; the associated value is an estimate.

MW - Monitoring well.

SQL - Sample Quantitation Limit.

U - The analyte was not detected.

$\mu\text{g/L}$ - micrograms per liter.

Table 7 Analytical Results from the Fourth Quarterly Monitoring Event Performed by Ecology (July 22 and 23, 1998) ($\mu\text{g/L}$)			
Well Name	Tetrachloroethene	SQL	Reference
MW-1 (Background)	0.87 J (8.7)	1	Ref. 7, p. 163; Ref. 24, p. 2
MW-6 (DL)	119	10	Ref. 7, pp. 254, 256; Ref. 24, p. 3
MW-2	142	10	Ref. 7, p. 258; Ref. 24, p. 3
MW-4 (DL)	264	20	Ref. 7, pp. 260, 262; Ref. 24, p. 3
MW-3 (DL)	1,170	50	Ref. 7, pp. 264, 266; Ref. 24, p. 3
MW-3A (DL)	1,030	50	Ref. 7, pp. 268, 270; Ref. 24, p. 3
HL-2 (DL)	62	10	Ref. 7, pp. 272, 274; Ref. 24, p. 3
HL-3 (DL)	349	10	Ref. 7, pp. 276, 278; Ref. 24, p. 3
HL-4 (DL)	151	10	Ref. 7, pp. 280, 282; Ref. 24, p. 3
HL-7 (DL)	540	50	Ref. 7, pp. 286, 288; Ref. 24, p. 3

Notes:

Blank cells indicate that the analyte was not detected.

Values in parentheses are the adjusted concentration as per *Using Qualified Data to Establish an Observed Release and Observed Contamination* (Ref. 6). Since the bias for all "J" qualified data was not included on the original Form 1s, all "J" qualified data are assumed to have an unknown bias.

Key

DL - Diluted sample.

HL - Hamilton Labree.

J - The analyte was positively identified; the associated value is an estimate.

MW - Monitoring well.

SQL - Sample Quantitation Limit.

U - The analyte was not detected.

$\mu\text{g/L}$ - micrograms per liter.

Table 8 Analytical Results from the First Semiannual Monitoring Event Performed by Ecology (February 2 and 4, 1999) ($\mu\text{g/L}$)			
Well Name	Tetrachloroethene	SQL	Reference
MW-1 (Background)	0.87 J (8.7)	1	Ref. 7, p. 163; Ref. 24, p. 2
MW-6	251	20	Ref. 7, pp. 674; Ref. 24, p. 3
MW-2	407	20	Ref. 7, pp. 676; Ref. 24, p. 3
MW-4	385	20	Ref. 7, pp. 678; Ref. 24, p. 3
MW-3	751	20	Ref. 7, p. 680; Ref. 24, p. 3
MW-3A	751	20	Ref. 7, p. 682; Ref. 24, p. 3
MW-8	1910	100	Ref. 7, p. 684; Ref. 24, p. 3
HL-2	93	20	Ref. 7, p. 686; Ref. 24, p. 3
HL-3	368	10	Ref. 7, p. 688; Ref. 24, p. 3
HL-4	44	10	Ref. 7, p. 690; Ref. 24, p. 3

Notes:

Values in parentheses are the adjusted concentration as per *Using Qualified Data to Establish an Observed Release and Observed Contamination* (Ref. 6). Since the bias for all "J" qualified data was not included on the original Form 1s, all "J" qualified data are assumed to have an unknown bias.

Key

HL - Hamilton Labree

J - The analyte was positively identified; the associated value is an estimate.

MW - Monitoring well.

SQL - Sample Quantitation Limit.

U - The analyte was not detected.

$\mu\text{g/L}$ - micrograms per liter.

Table 9 Analytical Results from the Second Semiannual Monitoring Event Performed by Ecology (July 6 and 7, 1999) ($\mu\text{g/L}$)			
Well Name	Tetrachloroethene	SQL	Reference
MW-1 (Background)	0.87 J (8.7)	1	Ref. 7, p. 163; Ref. 24, p. 2
MW-6 (DL)	169	10	Ref. 7, pp. 503, 505; Ref. 24, p. 3
MW-2 (DL)	285	20	Ref. 7, pp. 507, 509; Ref. 24, p. 3
MW-4 (DL)	363	50	Ref. 7, pp. 511, 513; Ref. 24, p. 3
MW-4A	377	100	Ref. 7, p. 515; Ref. 24, p. 3
MW-3	656	100	Ref. 7, p. 519; Ref. 24, p. 4
MW-3A	614	100	Ref. 7, p. 521; Ref. 24, p. 4
MW-8	1,370	100	Ref. 7, p. 523; Ref. 24, p. 4
HL-2	73	5	Ref. 7, p. 497; Ref. 24, p. 4
HL-3	379	100	Ref. 7, p. 517; Ref. 24, p. 4
HL-4 (DL)	138	10	Ref. 7, pp. 499, 501; Ref. 24, p. 4
MW-R5	2,700	2,000	Ref. 7, p. 525; Ref. 24, p. 4
MW-R6	36,100	2,000	Ref. 7, p. 527; Ref. 24, p. 4
MW-R4	4,890	500	Ref. 7, p. 529; Ref. 24, p. 4
MW-R7	3,190	1,000	Ref. 7, p. 531; Ref. 24, p. 4
MW-R2	20,500	1,000	Ref. 7, p. 536; Ref. 24, p. 4
MW-R1	6,740	1,000	Ref. 7, p. 538; Ref. 24, p. 4

Notes:

Blank cells indicate that the analyte was not detected.

Values in parentheses are the adjusted concentration as per *Using Qualified Data to Establish an Observed Release and Observed Contamination* (Ref. 6). Since the bias for all "J" qualified data was not included on the original Form 1s, all "J" qualified data are assumed to have an unknown bias.

Key

DL - Diluted sample.

HL - Hamilton Labree.

J - The analyte was positively identified; the associated value is an estimate.

MW - Monitoring well.

SQL - Sample Quantitation Limit.

U - The analyte was not detected.

$\mu\text{g/L}$ - micrograms per liter.

Ecology installed a well and treatment system on the Thurman well (HL-9) because it was the most highly contaminated domestic well (Ref. 19, p. 1). Table 9 presents pre-treatment observed release concentrations from the Thurman well detected during several monitoring events.

Table 10 Ground Water Monitoring Results for HL-9 Performed by Ecology ($\mu\text{g/L}$)								
Well ID	Sample Date	Tetrachloroethene	SQL	Trichloroethene	SQL	cis-1,2-Dichloroethene	SQL	Reference
MW-1 (Background)	4/98	0.87 J (8.7)	1	1 U	1	1 U	1	Ref. 7, p. 163; Ref. 24, p. 2
HL-9	1/20/99	2,540	100			42 J (4.2)	100	Ref. 7, p. 415; Ref. 24, p. 4
HL-9 (DL)	4/14/99	2,800	100	9.8	2	11 J (1.1)	1	Ref. 7, pp. 464, 466; Ref. 24, p. 4
HL-9 (DL)	6/2/99	1,460	50	9.2	2	20	1	Ref. 7, pp. 470, 472; Ref. 24, p. 5
HL-9	7/28/99	2,170	500					Ref. 7, p. 631; Ref. 24, p. 5

Notes:

Blank cells indicate that the analyte was not detected.

Values in parentheses are the adjusted concentration as per *Using Qualified Data to Establish an Observed Release and Observed Contamination* (Ref. 6). Since the bias for all "J" qualified data was not included on the original Form 1s, all "J" qualified data are assumed to have an unknown bias.

Key

DL - Diluted sample.

HL - Hamilton Labree.

J - The analyte was positively identified; the associated value is an estimate.

MW - Monitoring well.

SQL - Sample Quantitation Limit.

U - The analyte was not detected.

$\mu\text{g/L}$ - micrograms per liter.

- Hazardous Substances in the Releases

The hazardous substances that establish an observed release by chemical analysis are: cis-1,2-Dichloroethene, tetrachloroethene, and trichloroethene.

- Attribution

In 1994, testing of local drinking water wells by the Washington State Department of Health, revealed that six shallow wells were contaminated with PCE (Ref. 8, p. 1). PCE concentrations detected during the sampling ranged from 3 $\mu\text{g/L}$ to 2,165 $\mu\text{g/L}$ (Ref. 8, p. 1). The maximum contaminant level (MCL) for PCE in the Federal Drinking Water Regulations (40 CFR 141.6) is 5 $\mu\text{g/L}$ (Ref. 8, p. 1). Lewis County Public Services informed affected well owners of the test results and advised them to obtain alternate sources of drinking water (Ref. 8, p. 1). Ecology is currently supplying bottled drinking water for some of the families and businesses in the affected area (Ref. 8, p. 1). Ecology has installed a well treatment system on one residential well (well 9) (Ref. 19, p. 1).

In May 1996, confidential sources suggested that drums of solvents may have been buried or released on the property located northeast of the Hamilton/Labree Roads intersection (Ref. 8, p. 1). As a result of this information, in September 1999, 64 drums were excavated and removed from the suspected property at the intersection of Hamilton and Labree Roads (Ref. 14, pp. 1 through 3). Sludge collected from these drums contained PCE and degradation products of this substance, as illustrated in Section 2.2 of this document (Ref. 7, pp. 644, 647). The drums were transported offsite by the S.C. Breen Construction Company on November 4, 1999 (Ref. 14, p. 2).

In addition, as a part of the Source Investigation for this site, upgradient, downgradient, and cross-gradient ground water borings were drilled during two rounds of fieldwork performed by Ecology in January 1999 (Ref. 8, p. 4). The boring locations were selected based on the previous monitoring well volatile organic compound (VOC) results and the ground water flow direction (Ref. 8, p. 4). The monitoring wells were installed in 1997 (Ref. 5, p. 1). The ground water was sampled at two elevations in the shallow aquifer to determine the vertical, as well as the longitudinal extent of VOC contamination downgradient of the drum source and other suspected sources (See Other Potential Sources section below) (Ref. 8, p. 4, 31). Ground water was sampled at approximately 20-foot and 30-foot depths during the first round to determine the VOCs source and vertical and horizontal distribution of VOCs along the path of the contaminant plume (Ref. 8, p. 4). During the second round, ground water samples were collected at a single depth just below the water table (at 11 to 15 feet) to identify source(s) and also to better define the results of the first round (Ref. 8, p. 4). PCE concentrations ranged from 3.2 to 60,000 ug/L ; vinyl chloride concentrations ranged from 16 to 280 ug/L ; cis-1,2 dichloroethene concentrations ranged from 4.5 ug/L to 610 ug/L ; and trans-1,2 dichloroethene concentrations ranged from 4 ug/L to 5.4 ug/L (Ref. 8, Tables 3 through 7, pp. A-3, A-6, A-17, A-18).

The drum source is northeast from the PCE ground water plume (Ref. 8, p. 24). When sampled, the drums were found to contain the same contaminants as found in downgradient locations (Ref. 7, pp. 644, 647). Therefore, the drum source is considered to be contributing at least in part to the ground water contamination.

There may be evidence that demonstrates that the PCE has migrated to Berwick Creek, a nearby surface water body (Ref. 8, p. 24). The shallow aquifer is locally connected to surface waters, such as creeks (Ref. 15, pp. ES-1 and ES-2). Ecology collected four surface water samples from Berwick Creek which had concentrations of PCE ranging from 8.5 to 16 ug/L (Ref. 7, pp. 192, 296, 298, 300). In addition, cis-1,2-dichloroethene was detected in Berwick Creek at concentrations ranging from 1.2 to 4 ug/L (Ref. 7, pp. 192, 296, 298, 300).

Other Potential Sources

Another potential source may exist upgradient of the drum source, on Hamilton Road (Ref. 8, p. 4). A painting facility is located on Hamilton Road near well MW-3, and in the past was used as a transmission repair shop, which reportedly used solvents (Ref. 8, p. 4). Although several investigations have been conducted, including collecting ground water and soil borings in the vicinity of this facility, to date, none of the investigations have been able to identify a source of contamination on this property (Ref. 8, pp. 12, 13).

3.2 WASTE CHARACTERISTICS

3.2.1.3 Toxicity/Mobility

Table 10 below provides Waste Characteristics Factor Values for those hazardous substances associated with sources and/or attributable to the site.

Table 10 WASTE CHARACTERISTICS FACTOR VALUE					
Hazardous Substance	Source	Toxicity Factor Value	Mobility Factor Value^a	Toxicity/ Mobility Factor Value	References
cis-1,2-Dichloroethene	1, 2	100	1	100	Ref. 2, p. B-8
1,1,1-Trichloroethane	1	1	1	1	Ref. 2, p. B-19
Tetrachloroethene	1, 2	100	1	100	Ref. 2, p. B-18
Trichloroethene	1, 2	10	1	10	Ref. 2, p. B-19
Vinyl Chloride	1	10,000	1	10,000	Ref. 2, p. B-20

a - Liquid mobility factor values for all substances are used because Source 1 is drums that contain liquids (Ref. 14).

=====

Toxicity/Mobility Factor Value: 10,000

3.2.2 Hazardous Waste Quantity

Source No.	Source Hazardous Waste Quantity Value (Section 2.4.2.1.5)	Is Source Hazardous Constituent Quantity Data Complete? (yes/no)
1. Drums ^a	7.04	no
2. Contaminated Ground Water ^a	> 0	no

a - See Section 2.4.2 of this document.

3.2.3 Waste Characteristics Factor Category Value

The hazardous waste quantity factor value is 100 because there are targets subject to Level I concentrations (see section 3.1.1 of this document) (Ref. 1, Table 2-6).

Toxicity/mobility factor value x hazardous waste quantity factor value: 1×10^6
 $(10,000 \times 100) = 10^6$, capped at 10^8)

Hazardous Waste Quantity Factor Value: 100
Waste Characteristics Factor Category Value: 32
Ref. 1, Table 2-7

3.3 Targets

There are 252 wells within the 4-mile target distance limit (Ref. 16).

3.3.1 Nearest Well

Well: Well 9 (Thurman well)

The Thurman well is located on Hamilton Road at the intersection of Labree Road (Ref. 8, p. 24). Level I concentrations of PCE have been detected in this well and therefore, a nearest well value of 50 is assigned (Ref. 1, p. Section 3.3.1; Ref. 7, pp. 6, 8, 143, 145, 178, 180, 182, 184, 322, 324).

Nearest Well Factor Value: 50

3.3.2 Population

GW-Level I Concentrations

3.3.2.2 Level I Concentrations

Level I Well	Population	Contaminant	Benchmark Exceeded ($\mu\text{g/L}$) ^a	Date	Maximum Observed Release Concentration ($\mu\text{g/L}$)	Reference
Well 2 (Hamilton/Smith Tractor)	3	PCE	1.6	9/93	119	Ref. 2, p. B-18; Ref. 17, pp. 33; Ref. 19, p. 1
				6/96	130.2	Ref. 2, p. B-18; Ref. 17, pp. 108
				3/97	130	Ref. 2, p. B-18; Ref. 5, p. D154
				1/98	140	Ref. 2, p. B-18; Ref. 7, pp. 6, 8
				4/98	87	Ref. 2, p. B-18; Ref. 7, pp. 186, 188
				7/98	62	Ref. 2, p. B-18; Ref. 7, pp. 272, 274
				2/99	93	Ref. 2, p. B-18; Ref. 7, p. 686
				7/99	73	Ref. 2, p. B-18; Ref. 7, p. 497
Well 3 (High Reach/United Rentals)	11	PCE	1.6	9/93	122	Ref. 2, p. B-18; Ref. 17, pp. 29; Ref. 19, p. 1
				6/96	283.8	Ref. 2, p. B-18; Ref. 17, pp. 110
				3/97	270	Ref. 2, p. B-18; Ref. 5, pp. D152, D153
				10/97	347	Ref. 2, p. B-18; Ref. 7, pp. 348, 350
				1/98	380	Ref. 2, p. B-18; Ref. 7, pp. 10, 12
				4/98	381	Ref. 2, p. B-18; Ref. 2, p. B-18; Ref. 7, pp. 143, 145
				7/98	349	Ref. 2, p. B-18; Ref. 7, pp. 276, 278
				2/99	368	Ref. 2, p. B-18; Ref. 7, p. 688
				7/99	379	Ref. 2, p. B-18; Ref. 7, p. 517

Level I Well	Population	Contaminant	Benchmark Exceeded ($\mu\text{g/L}$) ^a	Date	Maximum Observed Release Concentration ($\mu\text{g/L}$)	Reference
Well 4 (Veenhouwer)	1	PCE	1.6	10/93	204	Ref. 2, p. B-18; Ref. 17, pp. 45; Ref. 19, p. 1
				6/96	203.6	Ref. 2, p. B-18; Ref. 17, pp. 116
				3/97	210	Ref. 2, p. B-18; Ref. 5, pp. D155, D156
				10/97	219	Ref. 2, p. B-18; Ref. 7, p. 360
				1/98	188	Ref. 2, p. B-18; Ref. 7, pp. 14, 16
				4/98	242	Ref. 2, p. B-18; Ref. 7, pp. 182, 184
				7/98	151	Ref. 2, p. B-18; Ref. 7, pp. 280, 282
				2/99	44	Ref. 2, p. B-18; Ref. 7, p. 690
				7/99	138	Ref. 2, p. B-18; Ref. 7, pp. 499, 501
Well 7 (Veenhouwer)	7	PCE	1.6	11/93	572	Ref. 2, p. B-18; Ref. 17, pp. 65; Ref. 19, p. 1
				3/97	570	Ref. 2, p. B-18; Ref. 5, pp. D158, D159
				10/97	613	Ref. 2, p. B-18; Ref. 7, pp. 356, 358
				1/98	708	Ref. 2, p. B-18; Ref. 7, pp. 20, 22
				4/98	762	Ref. 2, p. B-18; Ref. 7, pp. 178, 180
				7/98	540	Ref. 2, p. B-18; Ref. 7, pp. 286, 288
Well 9 (Thurman)	6	PCE	1.6	3/94	2,165	Ref. 2, p. B-18; Ref. 17, pp. 81; Ref. 19, p. 1
				6/96	3,009	Ref. 2, p. B-18; Ref. 17, pp. 120
				3/97	2,700	Ref. 2, p. B-18; Ref. 5, pp. D160
				10/97	3,740	Ref. 2, p. B-18; Ref. 7, pp. 322, 324
				1/99	2,540	Ref. 2, p. B-18; Ref. 7, p. 415

Level I Well	Population	Contaminant	Benchmark Exceeded ($\mu\text{g/L}$) ^a	Date	Maximum Observed Release Concentration ($\mu\text{g/L}$)	Reference
				4/99	2,800	Ref. 2, p. B-18; Ref. 7, pp. 464, 466
Well 9 (Thurman) continued				6/99	1,460	Ref. 2, p. B-18; Ref. 7, pp. 470, 472
				7/99	2,170	Ref. 2, p. B-18; Ref. 7, p. 631
				3/97	37	Ref. 2, p. B-19; Ref. 5, pp. D160
		TCE	7.7	10/97	12	Ref. 2, p. B-19; Ref. 7, pp. 322, 324
TOTAL POPULATION SERVED	28					

a - The benchmark provided is the lowest applicable benchmark for the associated analyte (Ref. 1, Section 2.5.1; Ref. 2).

Key

MCL - Maximum Contaminant Level.

MCLG - Maximum Contaminant Level Goals.

$\mu\text{g/L}$ - Micrograms per liter.

Based on the above information, the Level I concentration factor value is 280. This value is obtained by multiplying the total population served by wells subject to Level I concentrations by 10 ($28 \times 10 = 280$) (Ref. 1, Section 3.3.1).

Population Served by Level I Wells : 28
Level I Concentrations Factor Value: 280

3.3.2.3 Level II Concentrations

Not Applicable. All sampled drinking water wells are subject to Level I concentrations or potential contamination.

Population Served by Level II Concentrations: 0
Level II Concentration Factor Value: N/A

3.3.2.4 Potential Contamination

The City of Napavine currently operates 3 public supply wells (S02, S03, and S04) which serve approximately 1,256 people; all of these wells are screened in the shallow aquifer and are located within 3 to 4 miles from the intersection of Hamilton and Labree Roads (Ref. 3; Ref. 9; Ref. 16, pp. 286, 287). Well S02 contributes 41.2 percent, S04 contributes 43.1 percent, and well S03 contributes 15.7 percent to the system (Ref. 9). However, all of the wells are between 3 and 4 miles of the site, therefore, the total population served by the City of Napavine wells, 1,256 people, are assigned to the 3 to 4 mile distance ring (Ref. 3).

Distance Category	Total Wells Evaluated ^a	Potential Population ^b	Distance-Weighted Population Value (Ref. 1, Table 3-12)
0 to ¼ mile	8	20.8	17
> ¼ to ½ mile	6	15.6	11
>½ to 1 mile	28	72.80	17
1 to 2 miles	44	114.4	30
2 to 3 miles	71	184.6	21
3 to 4 miles	90	1,490	131

a - Well logs used to determine population. The total number of wells for each distance category does not include wells evaluated at Level I concentrations.

b - Potential population was calculated by multiplying the total wells evaluated by the number of persons per household for Lewis County (2.6) (Ref. 1, Section 3.3.2; Ref. 18). In the 3 to 4 mile distance ring, 1,256 people were added to the product of wells x 2.6 to account for the municipal wells.

Sum of Distance-Weighted Population Values: 227

Ref. 1, Table 3-12; Ref. 16; Ref. 18

Potential Contamination Factor Value: 23

3.3.3 Resources

Ground water is not used as a resource within 4 miles of the site. Therefore, a resources value of 0 is assigned (Ref. 1, Section 3.3.3).

=====

Resources Factor Value: 0

3.3.4 Wellhead Protection Area

No wellhead protection areas exist within 4 miles of Source 1 for the aquifer of concern. Therefore, a wellhead protection area factor value of 0 is assigned (Ref. 1, Section 3.3.4).

Wellhead Protection Area Factor Value: 0